Section D.1 Executive Summary

this is not a clear summary of the findings... the table does not seem to reflect what is stated as the purpose - the shading explanation is "occurrence" with no linkage to effects or threats. it seems too much information is attempting to be summarized into too small of a pie slice.

Section D.2 Organization of Appendix

The language in this section is troubling and suggests a lack of understanding of the complexity of the task at hand. For example: "changes to toxins" is the phrase used in the topic sentence. The concept as presented isn't the whole question here, changes to the environment and its functioning that affect biogeochemistry would be more appropriate phrasing of what I believe is being stated, but there is the additional aspect of environmental changes that do not "change the toxins" but may change their transport which has a whole suite of issues that need to be evaluated.

Section D.3.1 Selection of Water Quality Stressors for Analysis

The omission of "urban" sources is misled. Although there is little urban development directly within the legal boundaries of the Delta, a very large metropolitan area lies just west (upwind) of the Delta. There are numerous sources from the greater watershed and airshed that feeds the Delta, for instance there are numerous refineries and power plants that emit contaminants that may deposit on Delta watershed... may be a significant source of metals and other combustion byproducts to the foodweb, especially Hg.

Section D.4 Methods

The methods section is very thin. One example, there is a need to define which kd factor is discussed here as the term is used by many different fields of study for very different purposes. this is a huge oversimplification at least in terms of Hg and MeHg.

The numerical objectives and standards are not properly put into context. For instance, are the Hg concentration for aquatic effects is for direct poisoning, not for effects via bioaccumulation, which is what TMDL values are based on. There are orders of magnitude difference between the standards/objectives based on their intent and the method used to determine the effect.

The section on bioavailability is a poor oversimplification. Specifically for mercury… mercury in the dissolved phase of fresh waters is mostly in organic complexes in some Hg(II) form. a small fraction is in the MeHg(I) form - also mostly bound to organic matter. In more saline environments the Hg(II) is largely bound to halogens (Cl, Br). there is still much debate about exactly what form of Hg(II) is available to the bacteria that methylate it (one type of bioavailability) but it is believed to be a form that is weakly bound or easily reducible (operationally defined). then once methylated, the MeHg(I)-organic complex or MeHg(I)-inorganic complex may be taken up by the base of the foodweb (algae/biofilm...) and can then be bioaccumulated (a second type of bioavailability). it is important to note that for mercury bioaccumulation it is typically the first 2 steps (methylation and entry to the base of the food web) that are most important to biomagnifications (highly variable rates (roughly 10x to 100000x, across sites/seasons)... once in the base of the food web, biomagnification is typically restricted to roughly 10x per trophic step regardless of environment.

Section D.5.1 Mercury

The details are lost in this section. Mercury speciation in upstream watersheds is variable but the explanation speaks generally about Hg as though speciation does not matter. Cinnabar is the primary natural form in the Coast Range but there are also geothermal sources as well as various forms altered in the mining and processing legacy. Elemental mercury was used for gold recovery and can oxidize in the environment easily. Also, atmospheric Hg deposition from local sources (refineries, power plants, and forest fires - and historically retorting) as well as long-term transport from coal burning in China.

The assumption/estimation that relative percentage contributions of MeHg from upstream sources will reflect the relative percentage contributions of Hg is erroneous. Hg is not produced within the Delta, MeHg is – to the tune of 50% according to some estimates – which will alter the proportion of the contributions to Delta fish.

The section as a whole is confusing, constantly switching back and forth between Hg and MeHg and cross-threading lines of evidence and processes. The two must be considered separately and then linked where/when appropriate.

The concentration of MeHg in Delta waters is highly variable by season, tide and weather events. The statement that MeHg concentrations drop off to 0.05ng/L “downstream of Rio Vista” is wrong or at least not put into proper context or constraints. From my personal measurements, the location seems off to me as well... there is a relative water concentration "hole" in the Delta but it is not downstream of Rio Vista per se and there has not been definitive support that tidal exchange and sampling timing/methods were not to blame at least in part for this trend.

It is not clear why the standards/objectives presented in the table were chosen. Clearly, the high-end criteria do not apply to the purpose of this evaluation. Why not focus on CTR level of concern or the recent TMDL values instead?

technically, the Mokelumne/Cosumnes enters the Delta directly, between Galt and Terminous/Walnut Grove, and is not part of the San Joaquin watershed where the SJR enters the Delta. as a source to the Delta it should be considered a separate vector. The Cosumnes is also a unique case as it is not dammed like the other rivers are and does go dry upgradient of the Preserve (Galt) in the summer.

The remaining part of the section seems to need to be moved to the front of the section as it would better help orient the reader to the separate issues of Hg and MeHg and their relation to each other. the concern regarding biomagnification is MeHg but we need to consider sources of Hg as a substrate of internal production as well... then get into a budget and be clear about which one is being presented and discussed.

There is a long history of ignoring atmospheric deposition of Hg and focusing on the historic mining loads. Evidence suggests that atm dep may be as important to MeHg production as sediment-bound Hg, possibly more so. this is hotly debated but the proportion of atm dep Hg that is able to be methylated is 5 to 50 times the proportion of Hg that is available for methylation in sediment... therefore, even if a sedimentary source of Hg is 5 to 50x the atm source, they may contribute similarly to MeHg production... also, atm dep will not be affected by the proposed action, proposed restoration actions may be differently affected by atm deposited Hg. There are 2 lines of supporting evidence for this statement that atm dep of Hg cannot be ignored 1) Chesapeake Bay and SF Bay have similar Hg concentrations in sediment and biota despite a lack of a mining source of Hg in the Chesapeake Bay watershed (presumed to be primarily atm dep) and 2) Ridolfi et al., 2010 (Tomales Bay TMDL report) showed relatively similar MeHg in sediment and biota between the Lagunitas Creek and Walker Creek deltas despite vastly different Hg concentrations in the sediment (Walker Creek drains the Gambonini Hg mine).

Water operations section? This section is poorly organized and prepared. There appears to be no understanding of how the Yolo Bypass operates or how water moved through the Delta and its habitats. Seasonality of flows is of utmost importance to the discussion of operations with tidal considerations as well. Yolo Bypass and its tributaries, such as Cache Creek, are a major source of Hg to the Delta only under high flow conditions. Net flow in summer is reported as very small out to the Delta but some contest there is a net inflow from the Delta to the Yolo bypass in summer, low flow conditions because irrigation water is tidally pumped up the bypass to supplement agriculture within the bypass. Dilution would hardly be an issue during the time when Yolo Bypass is a source.

Restoration section... there are many variables that will play into whether a restoration plan will produce MeHg and how much, when etc... the considerations and potential mitigations are completely ignored here. instead, photodemethylation is focused on... as much of the annual "loading" from external sources occur in the winter, high flow conditions (and that is the focus of the discussion), photodemeth will not affect markedly loadings... regarding the restoration sites, again, many variables at play here and only this one is considered in the evaluation.

Modeling: The conclusion of the conceptual model section is that restoration actions are likely to have the largest effect on Hg and MeHg as a result of the proposed action... yet this is entirely left out of the model?? Then make a conclusion?